

As a general matter, Applicants greatly appreciate the clarification provided by the Examiner in the Office Action of 8 April 2003.

1. The Examiner has acknowledged an abstract and thus the objection to the lack of an abstract has been removed.

2. Claims 49 - 62 have been renumbered, because of an original omission of a claim 48, as claims 48 - 61. The Office Action contains certain grounds of rejection or objection as to the phrase "the emplacement surface" in claim 50 or in claims dependent thereon directly or indirectly. This phrase has antecedent basis in line 4 of the claim where "an emplacement surface" has been recited. None of claims 50 and the claims which depend therefrom remain objectionable with respect to the support for "the emplacement surface" or for the antecedent basis for this term.

3. A substitute specification is enclosed making the changes required in paragraph 7 on pages 3 and 4 of the Office Action.

The substitute specification does not contain any new matter.

The substitute specification provides the cross reference to related applications required by Rule 78 and appropriate section headings.

A marked up version showing the changes made is also enclosed.

In paragraph 7 of the Office Action the Examiner notes that numeral 5 is omitted in FIG. 6. In the passage corresponding to Page 16, line 17, the reference numeral "5" has been removed since the structure coincides there with that which is represented at "33".

4. The clarification of paragraph 8 on pages 4 and 5 of the Office Action are appreciated.

5. Since the claim rejections under 35 USC 112 of claims 32 - 47 and 49 - 56 have been withdrawn in paragraph 9 on page 6 of the Office Action no discussion is required.

6. With respect to the reinstatement of the claim rejections under 35 USC 112 in paragraph 10 on page 6 of the Office Action, the Examiner's attention is respectfully withdrawn to line 4 of claim 51 where "an emplacement surface" has been positively recited to provide antecedent basis for the limitation "the emplacement surface." This rejection should be withdrawn as well.

7. All grounds of rejection under 35 USC 103 should be withdrawn since all grounds of rejection rely upon HASLOP et al, BALTES et al and STEIN, with or without quaternary art or even quinary art.

Claim 32 has been amended to emphasize the fact that the observation window is viewed by the observer directly by the eye, thereby excluding a system as in HASLOP et al. The BALTES et al reference contains nothing which would suggest modification of HASLOP et al to permit direct visualization by the eye of the observer. Furthermore, the STEIN reference which has been relied upon by the Examiner as the third principal reference in the combination provides at 5 a detector which is clearly something other than the eye of the observer. Accordingly, the combination of HASLOP et al, BALTES et al and STEIN simply does not include, even if the combination is obvious and can be constructed as the Examiner suggests, "an observation window that can be viewed optically and visually directly by an eye of an observer...".

While the claims are discussed more extensively below, this distinction as to claim 32 renders claim 32 allowable and carries over with respect to claims 33 - 35, 37 - 44 and 46 - 61 and all of these claims must be considered to be allowed.

8. Applicants respectfully submit that claim 32 is not taught or suggested by a combination of the features of HASLOP et al, BALTES et al and STEIN. The Examiner notes that HASLOP et al

"do not display the light outputs, neither parallel nor convergingly, in an observation window." In fact, there can be no observation window in HASLOP et al since at the ends of the light guides 15 and 16 there are filters 13 and 14 followed by respective photomultipliers PM1 and PM2. There is no way that one can visualize directly by eye any characteristic of a bank note in HASLOP et al.

The Examiner refers to the light guide of BALTES et al but finds therein the capturing of a plurality of light beams "at different angles" although that is not the case. Note that in claim 32 not only is a divergent collection excluded but the collection of light at different angles is affected to the same size of the point from which the light is emitted.

In BALTES et al light is emitted to opposite sides of the point and at the same angle. Thus a distinction over BALTES et al as combined with HASLOP et al in addition to the observation window for direct visualizing is that different output light beams are captured.

With respect to STEIN et al there is not the least suggestion of either the direct visualization at the observation window by the eye of an observer or the capture of a plurality of light beams at different angles to the same side of the point from which the light beams are outputted.

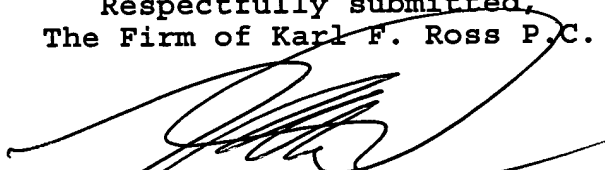
The combination of references does not, therefore, suggest the invention claimed in claim 32 or in any other claim.

Claim 32 and the claims which depend therefrom which are all the claims in the case are thus deemed to be allowable.

9. There are enclosed here copies of three references originally made of record in the specification and a PTO 1449 form formally listing them so that Applicant can be certain that they will be considered as references in the case and acknowledged in the patent to issue here. No certification or fee is required since those references were in the application papers originally.

Entry of the present amendment for appeal purposes or placing the case in condition for allowance is requested.

Respectfully submitted,  
The Firm of Karl F. Ross P.C.

  
By: Herbert Dubno, Reg. No. 19,752  
Attorney for Applicant

Enc: Substitute Specification  
Marked up version of Specification  
PTO FORM 1449 and 3 References  
Petition For Extension  
PTO 2038 Charge Form

26 September 2003  
5676 Riverdale Avenue Box 900  
Bronx, NY 10471-0900  
Cust. No.: 535  
Tel: (718) 884-6600  
Fax: (718) 601-1099

ge-



## TRANSLATION

## DESCRIPTION

DEVICE FOR ENABLING AN OBSERVER TO VERIFY THE ANGLE-DEPENDENT  
SCATTERING BEHAVIOR OF AN OBJECT

## SPECIFICATION

*CROSS REFERENCE TO RELATED APPLICATIONS*  
This application is a national stage of PCT/AT99/00297 filed 20 December 1999 and based upon Austrian national applications A 2038 filed 2 December 1998 and GM 808/99 filed 19 November 1999 under the International Convention. *TO FIELD OF THE INVENTION*

The present invention relates to a device for visual

verification of the angle-dependent scattering properties of an  
object by an observer, the device having

10 a holder which is provided with a measuring window that  
can be brought into a predetermined position relative to the object  
as well as an observer window which allows viewing by the observer.

The invention relates further to an apparatus for the  
visual comparison of the angle-dependent scattering properties of a  
test object with a reference object by an observer as well as to an  
15 apparatus for the optical verification of flat objects.

## BACKGROUND OF THE INVENTION

From U.S. Patent 5,596,402 a device of a similar kind is  
known. In this device, the light supply sends two light ray beams  
under sharply different incident angles to the measuring window,  
namely, a first incident angle  $\alpha_1$  and a second incident angle  $\alpha_2$ .

20 The patent is based upon the fact that the output angle  
 $\beta_1$  of the first reflected beam is equal to the <sup>incident</sup> ~~input~~ angle  $\alpha_1$ ,

thereof <sup>while</sup> the output angle  $\beta_2$  of the second reflected beam is equal to the incident angle  $\alpha_2$ .

The first reflected beam  $\beta_1$  is supplied directly to the observer via the <sup>observation</sup> behavior window. The second reflected beam  $\beta_2$  is deflected via a mirror to the observation window and the observer. For the generation of two light beams which are incident at different angles, the light supply encompasses either two distinct lamps or a single lamp arranged behind a diffuser disk.

With the known device it is therefore not possible to observe an object with a goniodispersed property, i.e. (it) <sup>which has</sup> reflection and transmission properties at different output angles, because the incident angle is held substantially constant. This property or behavior is described in the present description also as the "scattering property". By comparison, the conventional device permits only an observation under two distinct output angles.

From EP 0 530 818, a color reflection device is known in which light beams radiating out at different angles are captured by three light guides and fed to photo sensors. Ahead of the light guide inlet orifices are switchable cover flaps or shutters so that invariably only one light guide at a time conducts light to the photo sensor which can then carry out a color analysis. Colors with angle-dependent reflection or transmission-scattering properties are used for example in the case of currencies or automotive lacquers. The angle-dependent properties arise for example as a result of constructive and destructive interference and give changing color and luminescence patterns with certain

light incidence and with different observation angles. For <sup>A OBJECT OF THE INVENTION</sup> monitoring production and for verification purposes, especially with currency, it is desirable to provide a simple reliable apparatus for quick visual testing of these properties. The

5 invention has as its goal to provide such an apparatus. This <sup>object</sup> ~~aim~~ <sup>SUMMARY OF THE INVENTION</sup> is achieved with the aid of a device of the kind described at the outset which <sup>has!</sup> ~~is~~ characterized by]

10 a light feed which is carried by a holder and is trained to direct substantially parallel light beams at a predetermined angle on <sup>a</sup> ~~the~~ measuring window, and

a light guide device which is carried by the holder and captures light beams outputted from a point of the measurement window at a plurality of different angles and delivers them to the observation window in parallel or convergingly.

15 By "substantially parallel" a bundle of beams is to be understood in the present description as not diverging or converging more than  $\pm 10^\circ$  from their setpoint beam direction, i.e. which diverges or converges by a maximum of about  $20^\circ$ . The device according to the invention enables simple, reliable and rapid

20 visual verification of the angle-dependent reflection scattering properties or transmission scattering properties of an object in optionally many selected directions of their radiation and surface reflection radiation.

25 According to a first embodiment of the invention which serves to verify the angle dependent reflection scattering properties, the light feed and the light guide device are arranged on the same side of the measuring window. Alternatively, for



measurement of the transmission scattering properties, the light feed and the light guide device are arranged on different sides of the measuring window.

5 The observation window can be a display tube, an ocular, the surface of a lens or the like; according to a special variant of the invention, a viewing screen can be arranged in the observation window upon which the light beams impinge adjacent one another. Such a viewing screen can be equipped in an especially simple manner with scales, markings, reference scales or the like  
10 which permit in a simple manner the comparison of the imaged light beams.

The apparatus can be used for the measurement of reflection scattering properties or transmission scattering properties at predetermined wavelengths, in predetermined  
15 wavelength ranges, or over the total visible wavelength range. Advantageously, (while) light beams are trained on the measuring window so that the verification or testing covers the total visible wavelength region. In the case of wavelength converter inks, for example, UV converters, it will be self understood that also light  
20 outside the visible wavelength range can be trained upon the measuring window.

An especially advantageous embodiment of the invention is characterized in that the light feed has a light source, preferably a white light source and especially preferably a light emitting  
25 diode. Alternatively, the light feed also can collect ambient light and train it upon the measuring window, preferably where the

light feed is a light guide channel, especially a tube or a light waveguide.

The light guide device itself can be realized in different ways as well. According to a preferred variant of the invention, the light guide device can be a collecting lens, whereby the measuring window lies in the vicinity of the focal plane of the collecting lens. Such a light guide device captures light beams in an entire continuous region of different angles so that, stated otherwise, each angle can be determined and such that one color image differs from the next, especially in the case of OVIs (Optically Variable Inks) with distinct stepwise varying properties. It is especially advantageous when the collecting lens is a cylindrical lens. In this case, the angle-dependent properties are determined only in the plane normal to the cylinder axis and the observation window can be viewed, for example, with both eyes.

It is especially advantageous <sup>for</sup> ~~when~~ the collecting lens <sup>to be</sup> ~~is~~ a semicylinder, whereby the measuring window lies on or only a slight distance from the flat side of the semicylinder. In <sup>this</sup> ~~the~~ first case, the lens can be placed directly on the object to be tested.

It is also possible to embed the light feed directly in the semicylinder which yields an especially compact line.

Instead of a lens, the light guide device can also be a cylindrical hollow mirror, whereby the measuring window lies in the vicinity of the hollow mirror. Alternatively, the light guide device can be formed from prisms or preferably from individual

light guides as is known per se from EP O 530 818 and which are respectively arranged to receive the mentioned reflective<sup>ed</sup> light beams at different angles. In other words each light guide collects an output light beam at a certain angle leaving the measuring windows and supplies it to the observation window. In this manner, the reflection scattering properties <sup>or</sup> behavior or the transmission scattering properties behavior can be tested at certain <sup>discrete</sup> angles. It is especially advantageous when the ends of the light guides open adjacent one another in the observation window. The light guide locations thus supply colored light points which represent the reflection scattering properties or transmission scattering properties at certain angles and can be simply detected by a quick glance.

A further aspect of the invention resides in the provision of an apparatus for the visual comparison of the angle dependent scattering properties of a test object with a plurality of reference objects by an observer. This apparatus is characterized by at least two of the devices described according to the invention and which are connected together and have their observation windows lying adjacent one another. As a result, with a single glance, both observation windows can be <sup>seen</sup> encompassed and simply compared.

Preferably one of the units has a receiver for the reference object and the other unit an abutment for positioning the test object.

The reference object can remain permanently in one of the devices and the test object oriented relative to the reference object.

5 In a preferred embodiment of the apparatus, especially for flat bendable reference objects, the receiver can include a drum on which one or more reference objects can be fastened. When the drum is round, by rotation of the drum, one can switch between a plurality of reference objects. Independently of the form of the drum, when flat, bendable reference objects are used, a space  
10 saving can be obtained in that they can be wound on the drum.

Finally, another aspect of the invention involves the provision of an apparatus for the optical testing of flat objects which <sup>comprises</sup> (is characterized by) a combination of:

a housing,

15 an emplacement surface carried by the housing and having at least one first and at least one second region for supporting an object and for sliding shifting of the object between the first and the second regions,

20 a device of the aforescribed inventive kind which is carried by the housing and whose measuring window lies above the first region of the emplacement surface or coincides therewith, and an infrared camera which is carried by the housing and is trained on the second region.

25 The apparatus according to the invention enables the testing of a number of optical criteria as are especially used as security features for securities with a rapid and simple kind of manipulation. The configuration with multiple test regions on one

and the same emplacement surface enables the object to be simply and conveniently shifted from one region to the next for corresponding testing without the need intervening for lifting of the object or its removal. Especially, the combination with an  
5 infrared camera enables the additional testing of optical criteria in the infrared range.

An especially advantageously embodiment of the apparatus is characterized by the use of an infrared camera in the form of a black and white CCD camera which has a blocking filter for the  
10 visible light range. It has been found that a simple commercial black white CCD camera has sufficient sensitivity in the infrared range which can be utilized upon corresponding filtration. This solution is especially inexpensive by comparison with the use of  
infrared image converter tubes.

15 The output of the infrared camera can be simply made available of a corresponding output terminal of the housing so that an external monitor can be connected to it.

Especially advantageous, however, is to provide a monitor which is supported by the housing and is connected to the output of  
20 the infrared camera so that the apparatus is largely freestanding.

The infrared testing can operate with ambient light which falls on the test object to the extent that the ambient light contains a sufficient infrared component. Especially  
advantageous, however, is to have the housing carry a second light  
25 source which is trained from above on the second region and which

has a significant radiation proportion in the infrared range and can be selectively turned on. In this manner the apparatus is largely independent <sup>of</sup> (from) ambient light. It has been found that an especially inexpensive variant can utilize a glow filament lamp as the second light source.

The inventive concept of multicriteria testing can be made finer in that in a further preferred embodiment of the apparatus, the second region of the emplacement surface is light permeable and the housing carries a third light source which is oriented from below upon the second region and has a significant radiation component in the infrared range and can selectively be turned on. In this manner not only an infrared reflection property but also an infrared transmission property of the object can be monitored.

It is especially advantageous when the third light source additionally has a significant radiation component in the visible light range. In that case, a conventional transmitted light observation of the object with the free eye can be undertaken. An especially inexpensive solution is obtained here when a glow filament lamp is selected as the third light source.

In any case it is especially advantageous for the emplacement surface to have a third region for supporting the object and for sliding shifting of the latter between the first, the second and the third regions, whereby the housing carries a fourth light source which is trained onto the third region from above and has a significant radiation component in the ultraviolet range.

Thus as a further optical feature of the ultraviolet excitation properties of fluorescent printing inks as are widely used with securities can be verified.

5 Preferably the housing has a cover hood which is arranged above the emplacement surface and is formed with at least one lateral opening for access to the emplacement surface. Thus ambient light can be shielded from the test regions. It is especially advantageous for the third region to be spaced from the opening to reduce the escape of ultraviolet radiation from the  
10 opening.

According to a preferred feature of the invention, the emplacement surface can be equipped at a fourth region with an inductive sensor. Thereby the presence of inks with magnetic or metallic particles can be tested.

15 The invention will be described in greater detail based upon the embodiments shown in the drawing. In the drawing

FIG. 1 *is a diagram of a* (a first embodiment of a device [schematically] in section;

FIG. 2 *is a cross sectional view of* (a second embodiment of a device [in section];

20 FIGS. 3 *is a sectional view and FIG. 4 a plan view of* (and 4) a first embodiment of an apparatus for comparing the scattering behavior [in section and in a plan view];

FIG. 5 *is a perspective view of* a second embodiment of such an apparatus [in a perspective view];

FIG. 6 *is a schematic perspective view of* an apparatus for the optical verification [in a schematic perspective view]; and

25 FIG. 7 *is* a filter curve of the infrared filter of the apparatus of FIG. 6.

### SPECIFIC DESCRIPTION

The apparatus indicated generally with 1 in FIG. 1 encompasses a holding device 2 which is configured in the form of a wire frame and is applicable to the surface 3 of an article shown only partially. The holding device 2 defines on the surface 3 of the article 4 a measurement window 5 and, relative to the measurement window 5, the positions of a light guide 6 as well as of an observation window 7 which is viewable at the upper side of the apparatus 1 for an observer 8.

The light guide 6 carried by the holding device 2 trains a bundle of substantially parallel light rays 9 at a predetermined angle  $\alpha$  upon the measuring window 5. The angle  $\alpha$  can also vary slightly within the bundle of light rays 9, for example, by several degrees up to about  $\pm 10^\circ$ .

The light rays 10, reflected from each point of the measuring window 5 and ~~and~~ stated more precisely, said from the surface 3 of the article 4 at different angles  $\beta_1, \beta_2$ , etc., are collected by a light guide device 11 and are directed into the observation window 7 ~~parallel or converging~~ <sup>so as to be</sup> ~~with and~~ <sup>to</sup> toward the observer 8. The light guide device 11 is carried by the holding device 2 and in the illustrated example is a collecting lens whose upper surface is formed with the observation window 7.

When the surface 3 of the article 4 carries, for example, an ink color layer which scatters light in an angle-dependent manner, the observer is offered a pattern of mutually adjacent color differences 13-16 which correspond to the reflected colors at the respective angles  $\beta_1, \beta_2$ , etc.



It will be apparent that for the measurement of the angle-dependent transmission behavior of a transparent or translucent article 4, the device 1 can be simply modified in that the light input guide 6 and the light guide 11 can be arranged on different sides of the measuring window 5. For example, the holding device 2 can have a corresponding opening in which the article 4 can be laid so that it lies between the light input guide 6 and the light guide 11. All previous and subsequent embodiments can be analogously configured also for transmission verification apparatuses.

The light input guide 6 can, as has been illustrated in FIG. 1, contain its own light source 17. Alternatively, the light input guide 6 can capture ambient light and direct it at the angle or angles  $\alpha$  onto the measuring window 5. The light input guide 6 can thus supply white light as well as light with a predetermined amplitude profile in the wavelength range, for example, as a result of corresponding filtering of the ambient light, through the use of monochromatic or polychromatic light 17. In the illustrated case, the light source 17 is a white light producing light-emitting diodes.

The light guide device 11 can be a spherical collecting lens <sup>or</sup> as well as a cylindrical collecting lens. The measuring window is located approximately in the region of the focal plane of the collecting lens, i.e., slightly ahead of the focal plane, in the focal plane or slightly behind the focal plane.

FIG. 2 shows an especially simply and compactly constructed apparatus 1. The light guide device 11 is here a

5 cylindrical collecting lens in the form of a semicylinder and the  
Figure shows a section taken axially normally through the cylinder.  
The measuring window 5 lies on the flat side of the semicylinder,  
the observation window 7 lies on <sup>one</sup> ~~own~~ side of the curved upper side  
of the lens. The light feed 6 is a channel bored into the opposite  
side of the curved upper side and is positioned to capture ambient  
light at its inlet and trains ~~X~~ it on the measuring window. The  
light feed 6 is thus directly embedded in the semicylindrical light  
guide device 11; in other words, the light guide device 11  
10 simultaneously forms the holding device 2 for relative positioning  
of the light feed 6, the measuring window 5, the light guide device  
11 and the observation window 7.

15 To exclude the influence of impeding ambient light, the  
semicylinder is provided with an opaque coating 18 except at the  
inlet mouth of the light feed 6, the measuring window 5 and the  
observation window 7 is provided with an opaque coating 18.

Instead of a light-feed channel, the light feed 6 can  
also be a light-emitting diode (device) embedded in the semicylinder  
or mounted on the semicylinder.

20 The measuring window 5 can also lie in, shortly ahead of  
or behind the focal plane of the cylindrical lens. When the latter  
is not a semicircle in section but rather has a circularly  
segmental form, i.e. the cylinder is not divided at the half but is  
divided outwardly of the center, the measuring window again can lie  
25 on the flat side so that the lens can be placed directly on the  
article.

The apparatus illustrated in FIGS. 3 and 4 serves to compare the angle-dependent reflection properties or transmission properties of a test object 4' with a reference object 4" whereby both for the test object 4' and for the reference object 4", a respective test device 1' or 1" is provided. The devices 1', 1" are disposed alongside one another and are connected together (see FIG. 4) whereby their observation windows 7 lie next to one another and with a quick glance, a comparison is made possible. Each of the devices 1', 1" has, further, a light feed 6, a measuring window 5, a light-guide device 11 and an observation window 7.

In the embodiment of FIGS. 3 and 4, the light guide device 11 is formed from individual light conductors 19 which are oriented respectively at one of the angles  $\beta_1$ ,  $\beta_2$  or the like of the light beams 10 and capture these with their correspondingly oriented ends 20. The opposite ends 21 of the light wave guides 19 open at the upper side of the holding device 2, which is here configured in the form of a housing, at the observation window 7 or to form the observation window 7.

The device 1" has a receiver 22 fixed below the measuring window 5 for accommodating the reference object 4". This can be, in the illustrated example, a valid security ~~X~~ or piece of currency ~~X~~ and is wound onto a flattened drum 23 which can be laterally shifted into the receiver 22. The drum 23 can also be provided with a place for a number of different reference currencies 4" and can be rotatable so that the device can be switched between these reference currencies. The receiver 22 can, however, be configured for selective replacement of various reference objects.

The device 1" has a platform 24 on which the test article 4', for example, an article of currency, can be placed. For exact alignment of the test article 4', corresponding abutments 25 are provided on the platform 24.

5           FIG. 5 shows another embodiment of an apparatus having two devices 1', 1" connected together. The apparatus is comprised of a single continuous semicylindrical lens 11, similar to that of the embodiment of FIG. 2 and on which a light feed 6 with an integrated light source 6 is mounted. On the upper side of the  
10           semicylindrical lens 11 there are provided observation windows which need not be further delimited or framed. The apparatus can be placed on a platform 24 or can be fixed or articulated thereto at 26; abutments 25 are arranged on the platform 24 for positioning the test object 4' and the reference object 4".

15           Apart from the observation window 7 or observation windows 7, in each embodiment, scales, color scales or the like 27 can be provided. With the aid of such scales it is possible even with a single device 1 to make a comparison with predetermined setpoint or reference values.

20           In an embodiment, not shown, the observation window 7 can also be arranged to have a viewing screen on which the light rays  
10           impinge after they have traversed the light guide device 11 and with which the diffusion effect of the viewing screen can supply an image readable from a number of directions. The light feed 6 must  
25           have a power capacity which suits this embodiment.

FIG. 6 shows an embodiment of an apparatus for the optical testing of flat objects, especially securities or currency

using a number of criteria. The apparatus encompasses a housing 30 which offers the user a substantially horizontal placement surface 31 on which flat objects (not shown), can be laid. The placement surface 31 is overlain by a part of the housing 30 in the form of an cover hood 32, whereby the cover hood 32 enables access to the placement surface 31 through an opening directed to the front.

The placement surface 31 encompasses a number of regions 33-36 (signified by broken lines in the drawing) on which an object (not illustrated) can be supported or can be deposited. The emplacement surface 31 is connected to or flush with a region 33-36 adjacent it so that an object can be simply shifted between the region 33-36 back and forth. The regions 31-36 need not necessarily be located adjacent one another but can also partly or wholly overlap and as to that there are certain preferences which will be detailed subsequently.

Over the first region 33 a device 1 is supported by the housing 30 such that its measuring window (5) is disposed above a first region 33 or coincides with it. The device 1 can be constructed as has previously been illustrated in connection with FIGS. 1-5 (also complete units according to FIGS. 3-5 are possible) and is thus not shown with the exception of its observation window 7. When the device 1 tests the transmission scattering properties, it is in part arranged below the emplacement surface 31, i.e. the emplacement surface 31 or the first region 33 extends into the device 1.

The housing 30 carries an infrared camera 37 which is trained on the second region 34 of the emplacement surface 31. The

infrared camera 37 is a commercial black-white CCD camera which is provided with a blocking filter 38 for filtering out the possible light range.

5 The filter curve of the blocking filter 36 is illustrated in FIG. 7. FIG. 7 shows the relative light power transmission in percent, normalized with respect to air, i.e. 100% corresponding to the transmission through air, versus the wavelength in nm. It is apparent that in the visible light range (380-760 nm), the transmission amounts to substantially 0% and in the infrared range  
10 sharply increases.

The output signal of the infrared camera 37 can be available at the output connector 39 of the housing 30 for connection to an external monitor (not shown). Alternatively, or additionally, the housing 30 carries in itself a small monitor 40  
15 of the LCD type.

In the housing 30, a "second" light source 41 is arranged which is trained on the second region 34 and has a significant proportion of its radiation in infrared. (The "first" light source is such that it itself is arranged in the device 1.) Especially  
20 suitable are commercially available inexpensive glow filament lamps which have a large infrared proportion.

By means of the infrared camera 37 with the aid of ambient light or the light source 41, an infrared reflection image of an image in the region 34 can be produced and, for example, can  
25 be displayed on the monitor 40.

The emplacement surface 31 can be constructed so that it is light permeable in the second range 34, for example by the flush

insertion of a glass pane as has been indicated at 42. Beneath the glass pane 32 a third light source 43 is arranged in the housing 30 and has a significant radiation component in the infrared range and again preferably is formed by a glow film lamp. When the third  
5 light source 43 is turned on, an infrared transmission image of the object in the region 34 can be produced by the infrared camera.

The light source 43 in the form of a glow lamp also has a significant radiation component in the visible light range. When the light 34 is turned on, a transmission image visible with the  
10 free eyes can be obtained from an object.

The control of the second or third light sources 41, 43 is so carried out that respectively only one of the two light sources is turned on.

In a rearward portion of the cover hood 32, i.e. spaced  
15 as far as possible from the opening, a third region of the emplacement surface 31 is formed. Above the third region 35 a fourth light source 45 is arranged which has a significant radiation component in the ultraviolet range. The fourth light source 45 is covered by a shielding plate 46 to prevent a direct  
20 view by the observer of the light source 45.

This arrangement enables the excitation of the fluorescent inks (UV converters) of objects to be observed with the free eye.

The fourth light source ~~40~~<sup>45</sup> is preferably a gas-discharge  
25 lamp. Such lamps require a certain time for turning on. To avoid the waiting periods in operation, the fourth light source 45 can be continuously switched on. This means that the third region ~~45~~<sup>35</sup>

should be spaced by a certain distance from the second region 34 so that image distortions of the infrared camera having their origins in flicker effects of the gas-discharge lamp, should the regions 34 and 35 overlap, can be avoided.

5           The fourth region 36 is formed on the emplacement surface 36, in addition, and is equipped with an inductive sensor. With the aid of this sensor, the presence and optionally also the arrangement of inks with magnetic or metallic particles can be detected. Signal lights 47 are turned on by the induction sensor  
10 of the region 36 to render the sensor results optically effective. The sensor measurements can also be displayed on the monitor 40 or also with the aid of an acoustic signal.

          The testing evaluating devices associated with the regions 33-36 can remain continuously in operation after the  
15 apparatus has been turned on (independently of the condition that the light sources 41 and 43 are to operate only alternatively) or the individual devices can be set in operation sequentially (independently of the preference that the ultraviolet source 45 should remain continuously in operation). To simplify the  
20 operation as much as possible, a single button 48 can, for example, be used which will trigger these control functions and/or a rotary selection switch 49 may be amplified.

          The aforescribed devices and apparatuses can be used for all kinds of objects and reflections or transmission-scattering  
25 subjects and thus for example also for cinegrams, surface-lighted holograms and transmission-lighted holograms or the like. It is also possible to further evaluate images which appear in the



observation window automatically or mechanically, for example by capturing an image with a photographic camera for processing the image with the aid of a CCD camera and associated image transmission, image evaluation, image processing and image  
5 archiving processes which are known in the art. Such further processing is also possible for the output signal of the infrared camera.